

PERSPECTIVES IN TROPICAL BOTANY: CONCLUDING REMARKS

PETER H. RAVEN¹

It would be unrewarding to attempt to summarize the rich sampling of perspectives in tropical botany that has been provided by the five papers in this symposium. Each should be read for what it has to offer in insight and in vistas for future research. In these concluding remarks, I wish instead to offer some thoughts on the general state of tropical research, and to attempt to put them into a global perspective.

Judged from statistics about relatively well known groups of animals and plants, there are likely to be about twice as many species of any group in the tropics as in temperate regions. About 1.5 million kinds of organisms have been given names during the first 225 years of our effort to do this, and there are probably at least twice as many that remain to be named. Of these, perhaps two-thirds of the estimated 1.5 million organisms of temperate regions have been named, but no more than one in five of those in the tropics.

In 1975, the following estimates of cumulative destruction of tropical forest were made by the Food and Agriculture Organization (FAO) of UNESCO (Sommer, 1976):

Original area of tropical rain forest (world): 16 million km²

Area in 1975: 9.35 million km² (reduction of 41.5%)

Destruction to 1975:

Latin America	36.6%
Southeast Asia	38.1%
Africa	51.9%
India, Sri Lanka, Burma	63.3%

A doubling in population size is projected for all tropical countries by the end of the century. Although inroads are being made into the difficult problems of expanding food production in the tropics, the Environmental Fund predicts that annual population growth will outstrip growth in food production in each of the major tropical areas of the world through 1985, which is as far as they have attempted to project. Statistics such as these lead to forecasts such as that of the destruction of all moist tropical forest in the Philippines and Malesia within 5 to 10 years, and throughout Indonesia within 15 to 20 years. Worldwide, it appears likely that virtually all tropical forest will be destroyed or at least irreparably damaged by the close of the century, although it will probably still persist in a few local areas, perhaps including portions of the Amazon Basin, by that time.

Projected rates of growth in population, food, and energy lend little hope for a reversal of these trends. For example, the FAO estimates that by 1985 some

¹ Missouri Botanical Garden, 2345 Tower Grove Avenue, St. Louis, Missouri 63110.

26 countries, with an aggregate population of 365 million people, will be unable to produce enough food to prevent gradual starvation. In addition, if most tropical forest will have been removed by the end of the century, what of the quarter to half million people who make their living at present by slash-and-burn agriculture in this forest?

Tens of millions of people in the world starve to death each year at the present time, and with these trends being what they are, it appears likely that hundreds of millions will starve in tropical countries during the coming two decades. The countries involved, which will mostly become preoccupied with life-and-death questions of food and energy, will be unlikely to be able to divert many of their precious financial reserves to the study of the forests and other natural ecosystems, even though the sustained productivity of their lands ultimately depends upon such knowledge (cf. Janzen, 1973). It therefore will apparently be up to developed countries such as the United States to devote the necessary capital to gaining whatever ecological knowledge it might be possible to accumulate during these critical years. Only by doing so will it be possible to gain a measure of world stability for our successors in the twenty-first century.

In the light of these facts, it would appear that there is little or no chance for the long-term preservation of a significant sample of tropical diversity. Many of the two million or more species of animals and plants that occur in the tropics and which have never been catalogued or given a scientific name will become extinct before they are collected once; however, since our generation alone will be able to deal with them, we should make every effort to preserve samples for those who will follow us to study and to use to answer a host of questions about the diversity of life on earth that have not even been formulated yet.

In terms of formal inventories, the rates of completion of tropical floras are such that, when compared with the rate of destruction of the forest themselves, they appear pathetically low. We are simply not devoting sufficient resources to these projects to allow for their completion in a timely fashion. It would be highly desirable to step up our input into them, especially by involving more of the citizens and institutions of the tropical countries themselves in the project and by securing adequate funding from whatever sources appear possible. No matter how energetic these efforts may be, however, it is clear that the inventories will not be completed in time to provide a basis for further biological generalities or extrapolations of higher order: questions about biological interactions must be asked *now*, if we are to learn anything about the functioning of ecosystems upon which a growing proportion of the human race depends for survival.

Tropical biology of all kinds must receive a high priority in both research and training programs, at every level, and within every competent body. We can learn about the nameless and unknown plants and animals of the tropics only for a few more decades; our survival depends directly upon an understanding of the way in which they maintain a stable productivity in the hottest and rainiest areas of the world, often on extremely infertile soils. The attainment of such knowledge by our own generation is of crucial importance, since our children and grandchildren will not be able to help.

LITERATURE CITED

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